NEWSLETTER

Of The

Arboretum of The Barnes Foundation

MERION, PENNSYLVANIA 19066 NUMBER 10 • MARCH 1973

MORROCO AND THE CANARY ISLANDS

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On December 25, 1972, my wife and I, accompanied by two adults and two grandchildren, flew from Philadelphia to Paris. Three days of sightseeing in our favorite city included visits to Notre Dame, the Panthéon, the Louvre and a trip by bateau-mouche on the Seine. The last-named afforded us a glimpse of the renowned but very dormant Jardin des Plantes. We then flew, with the children, to the Riviera to join the rest of the family in a villa which they had rented for the winter at Grasse.

The Domaine du Blanchissage, as the villa is called, is a seventeenth century structure, lived in at one time by Princess Pauline Borghese, a sister of Napoleon. It lies deep in a well-watered valley and the sun's rays seldom touch it until mid-morning during the winter months. It derives its name from a large stone enclosure into which streams of water from the surrounding hills ceaselessly and noisily flow. It must have served as a community washing and rinsing center for countless generations of residents of the community and one can well imagine that the flow of village gossip kept pace with the steady outpouring of streams of water.

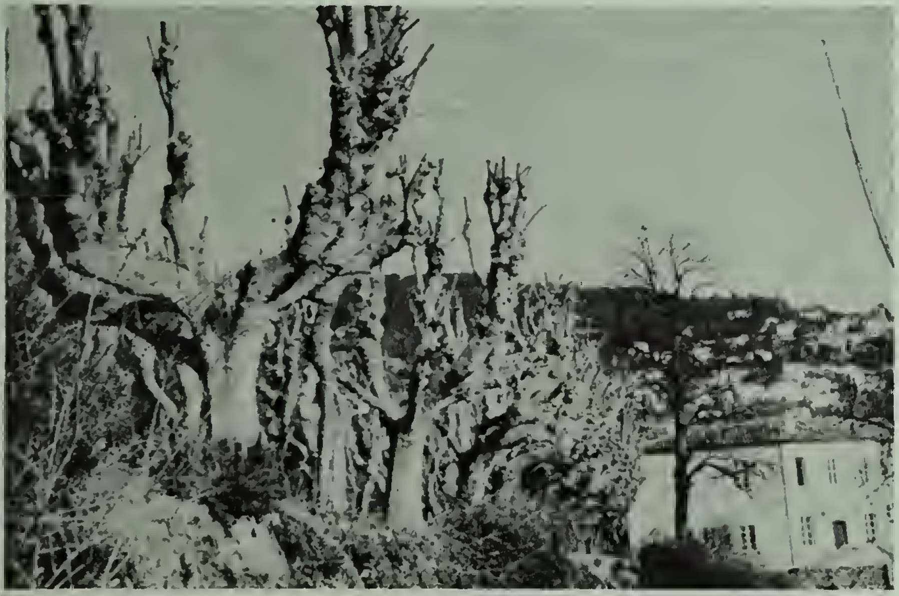

Fig. 1. Le domaine du Blanchissage, showing pollarded plane trees.

Fig. 2. Entrance to King's Palace at Casablanca

The vegetation around the villa was typically Mediterranean in character. The conspicuous evergreen trees were cork oak *(Quercus suber)* and olive *(Olea europaea)*, with an occasional cypress *(Cupressus sempervirens)*. Among shrubs with persistent foliage were the laurel or bay *(Laurus nobilis)* and the laurestinus *(Viburnum Tinus)*. The laurel was in full fruit, its polished black drupes in marked contrast to the dark green foliage. The laurestinus was just coming into flower, although many of the plants still bore corymbs of last year's purple-black fruits. Two other ubiquitous shrubs were the mastic *(Pistacia Lentiscus)*, with resinous, pinnately compound leaves and catkin-like flowers and the strawberry-bush *(Arbutus Unedo)*.

Three woody members of the lily family were abundant. One was the butcher's broom *(Ruscus aculeatus)*, a formidable evergreen shrub with branches flattened into sharp-pointed leaflike blades. Another was *Asparagus acutifolius*, a much branched scrambling species with leaves reduced to mere scales. A third was *Smilax aspera*, a spiny climber with shiny, leathery cordate leaves, one of Europe's few representatives of this genus.

Fig. 3. Shopping center en route to Ourika Valley

The beautiful crown anemone *(Anemone coronaria)* was just starting to bloom, its pinkish flowers dotting the coarse grass like so many stars.

Along the west side of the villa was a long double row of London plane trees which had been so frequently pollarded that their limbs resembled a line of serpents. The gardener who was in charge of the operation was unable to explain the reason for this mutilation. Apparently it had always been done and would therefore continue to be. One can only suppose that the sole advantage might be a dense avenue of shade in the summer months. (Fig. 1).

Near the house was a planting of the so-called Mexican orange *(Choisya ternata)*, an evergreen shrub with aromatic trifoliate leaves and fragrant white flowers which at the time of our visit were fully out.

The slopes north of Grasse which form the foothills of the Alpes Maritimes had recently been powdered by a light fall of snow. We drove up toward them one morning and got out to examine the vegetation, which was extremely sparse. The most conspicuous plant was *Juniperus Oxycedrus*, a dense shrub with very sharp needle-like leaves. Accompanying it were Spanish broom *(Spartium junceum)*, a rock rose *(Cistus albidus)* and a *Genista* (probably *G. cinerea*). This is the type of plant community known as maquis which generally results from the cutting or burning of the original forest. Although somewhat forlorn during the winter months, the spring rains usually clothe it with a brilliant display of bulbous and other herbaceous plants.

Fig. 4. Tichka Pass

Leaving the two grandchildren with their uncle, aunt and four cousins in Grasse, we departed on the afternoon of New Year's Day for Casablanca where we joined the other two members of our group, who in the meantime had been sojourning in Majorca.

Our reasons for visiting Morocco, and later the Canary Islands, were several. In the first place we wanted to photograph plants and get herbarium specimens for the arboretum. Also, we wished to collect living plants of several kinds of succulents. Finally we regarded this trip as a means of formulating plans for a possible Barnes Arboretum Tour at some future time.

Fig. 5. The High Atlas Mts.

As Christopher Kininmonth has stated, in his invaluable "Travelers' Guide to Morocco", the visitor to this country will find it unlike any he has ever seen, even though he be familiar with the rest of North Africa. He is speaking, of course, primarily of its culture, which has been so sharply influenced by its long period of isolation from Europe and the rest of the Moslem world. But the same holds true for many of its other aspects and he goes on to say that it is "a land of great and even extravagant scenic beauty. Mountains and plains on a huge scale; ocean coasts and Sahara wastes". All of this is reflected in its agriculture and native vegetation, which combined to make our two weeks stay there an exciting experience.

Casablanca, the commercial capital, a thoroughly modern, white city on the edge of the sea, holds comparatively little of interest for the visitor. On the morning following our arrival we spent an hour in the very extensive and scrupulously clean market. The section devoted to flowers was, as might be expected, replete with such African genera as *Gladiolus, Watsonia, Freesia, Strelitzia* and *Zantedeschia;* however roses, carnations and iris were obviously popular with the customers.

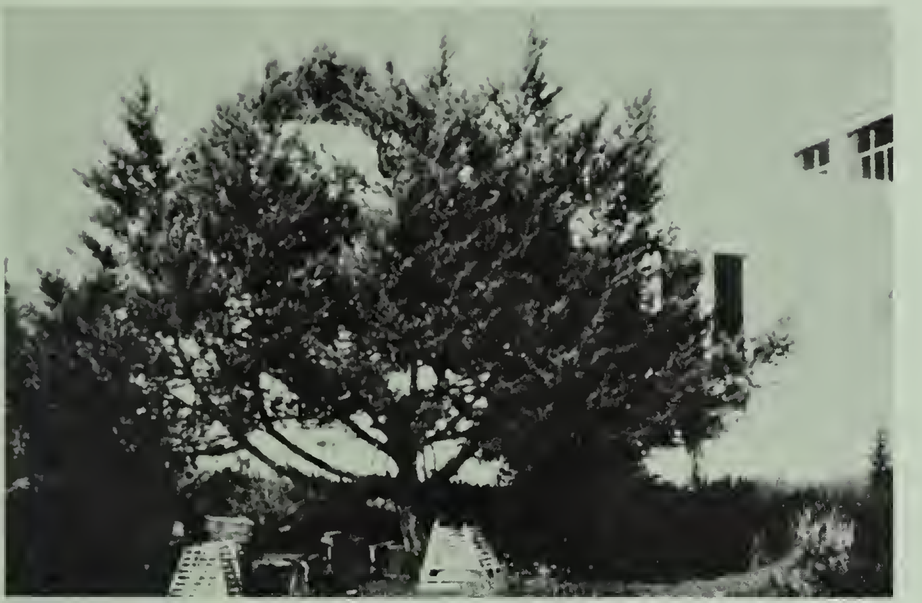

Fig. 6. *Juniperus phoenicia* in the Botanical Garden at Rabat

Our morning sight-seeing also included the King's Palace (he has one in every major and some not so major cities), the beautifully planted Mosque Square, the very modern Notre Dame de Lourdes church and the handsomely laid out Park of the Arab League. (Fig. 2).

A brief mention of some of the ornamental plants observed that morning indicates the warm temperate nature of the climate. Among others there were two "figs" (*Ficus elastica* and *F. religiosa*), the Norfolk Island "pine" *(Araucaria excelsa),* the Peruvian pepper tree *(Schinus molle),* poinsettia *(Euphorbia pulcherrima),* angel's trumpet *(Datura candida)* and the ever popular American century plant *(Agave americana).* South Africa was represented by several species of *Aloe, Portulacaria afra, Tecomaria capensis* and *Plumbago capensis.*

In the afternoon we drove to Mohammedia, an attractive seaside resort as well as an important commercial port. We wandered for a while around the beautifully planted grounds of the Miramar Hotel, where we saw many of the plants we had noted earlier in the day. One interesting novelty was the Brazilian pepper tree *(Schinus terebinthifolius).* This species differs from its Peruvian relative by having upright panicles of brilliant red berries.

On Wednesday, January 3, we set off on an all-day excursion to El Jadida, some 60 miles to the southwest of Casablanca. The excellent highway led through rich agricultural land where wheat, potatoes and sugar beets were the principal crops. A frequent sight was a camel teamed with a donkey for plowing the fields or transporting farm equipment. Roadside weeds are often intriguing and we noted with interest the occurrence of such familiar escapes as castor bean, horned poppy *(Glaucium),* fennel and the American wild tobacco *(Nicotiana glauca).*

Fig. 7. Field of mint east of Rabat

We stopped briefly at Azemmour, a Portuguese fortification, dating from the fifteenth century, and then continued on to El Jadida.

This site is believed to have had its beginnings as a Phoenician settlement in the fifth century B.C. The Portuguese built a fort here in the sixteenth century and for the next few hundred years it was an important port. We walked for some time around the ramparts which afforded interesting views of the town and the harbor. The most celebrated feature of El Jadida is the underground Portuguese cistern sunk below the governmental buildings and illuminated by a shaft of light from the well-head above.

We had lunch that day on the terrace of a seaside restaurant. Between us and the beach was a spectacular display of aloes in full bloom with brilliant racemes of reddish flowers. An interesting shrub, which we were to see everywhere from now on, was *Retama monosperma,* a legume with leafless rush-like branches and small clusters of white flowers. Another shrub, which is fairly common throughout the Mediterranean, was *Myoporum undulatum.*

Fig. 8. Sheep on the way to market

Following lunch the next day we traveled by train from Casablanca to Marrakech. Morocco is possessed of an excellent railway system and the three and a half hour ride in a first class coach was extremely comfortable. For the first 75 or 80 miles we traversed flat farm or grazing land; then the train began a gentle ascent and the only plants we saw were eucalyptus and opuntias, the latter often occurring as solid stands several acres in extent. Occasionally we were treated to fleeting views of the snowcapped mountains many miles away. As we approached the city date palms became increasingly abundant, emphasizing the fact that Marrakech is truly an oasis.

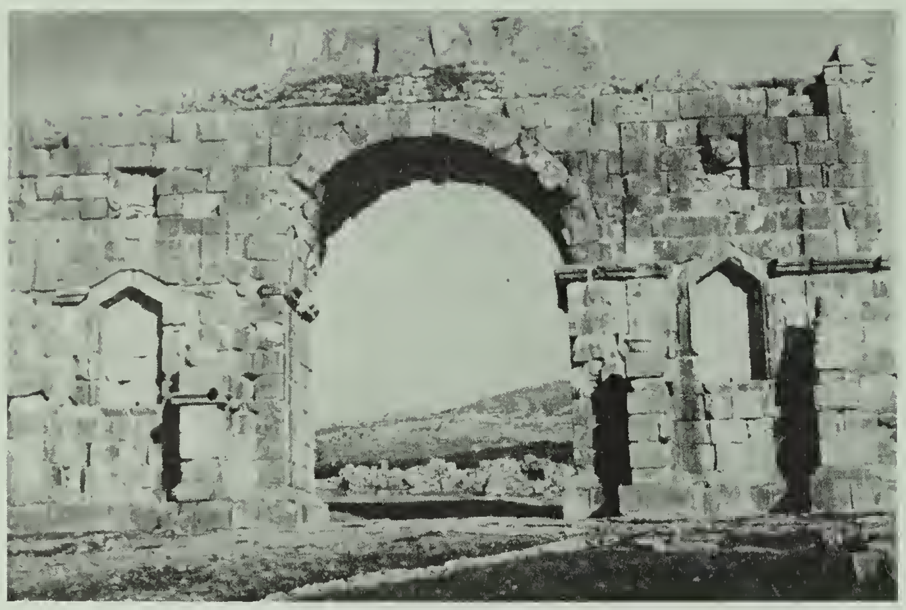

Fig. 9. Roman arch at Volubilis

Our headquarters were at the Mamounian, a hotel richly decorated in the Arab tradition. It is situated just inside the walls of the medina or town and is surrounded on three sides by a fine garden. We arrived a little before sunset and from our balconies had a superb view of the minaret of the Koutoubia mosque, the city's most venerable religious monument.

Our sightseeing the following morning comprised visits to the King's Palace, the Saadi tombs and El-Badi Palace, a sixteenth century structure now in ruins but boasting parterres of orange trees and replete with storks' nests. This was followed by a walk through the souks or market where, had it not been for our guide, we might still be wandering helplessly.

That afternoon we went first to the Menara Garden which is really not so much a garden as it is an enormous reservoir surrounded by olive groves. The entrance is through a nineteenth century pavilion which, though not distinguished, is the embodiment of royal luxury.

Our next stop was a far more pleasurable and rewarding one. It was in the Majorelle Gardens that Winston Churchill loved to paint and a pavilion dedicated to his use stands somewhere near its center. It is a garden of quiet charm, with bamboos and palms of numerous kinds, cacti and succulents from many countries, bougainvilleas of unbelievable brilliance, aroids, bromeliads and a host of interesting and unusual aquatic plants. Unfortunately as is the case with so many well-established gardens, the mature trees have formed such a dense crown of foliage overhead that photographing is almost out of the question.

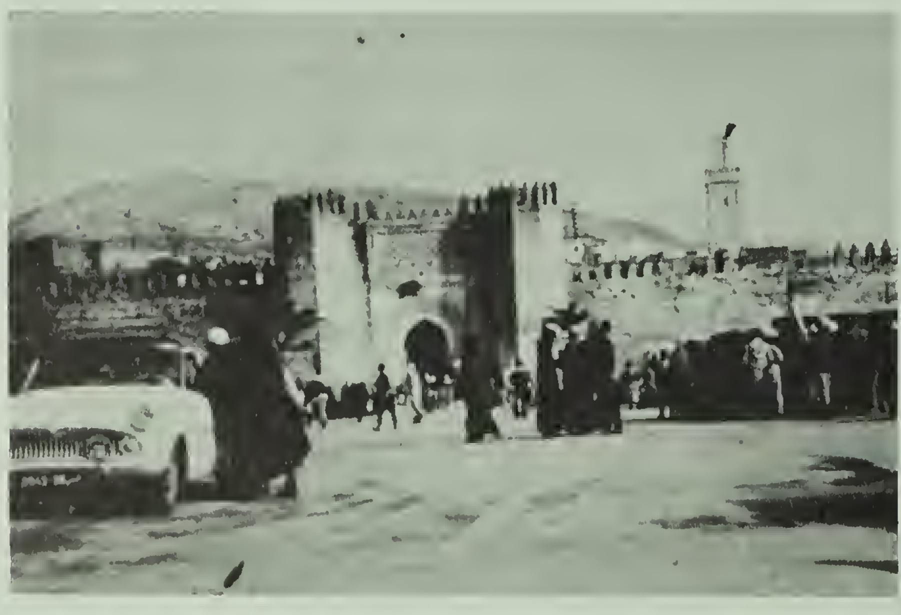

Fig. 10. Gate and minaret at Fes

Late that afternoon we spent some time in the Jemaa el-Fna. This is an open space near the center of the medina which late in the day becomes a scene of great activity. Here, surrounded by great throngs, are acrobats, storytellers, snake-charmers and dancers.

On Saturday, January 6 we took a half-day drive up into the Ourika Valley. The road leads for some miles across a barren plain, then begins to ascend into a region of undulating terrain. At frequent intervals along the roadside were stands where boys were selling minerals: amethysts, lapis lazuli, agate and quartz geodes. Only the consideration that we were traveling home by plane preventing us from plunging heavily. At one location there was a long row of roadside booths offering beads, pottery, brass and copper ware and, of course, amethysts. (Fig. 3).

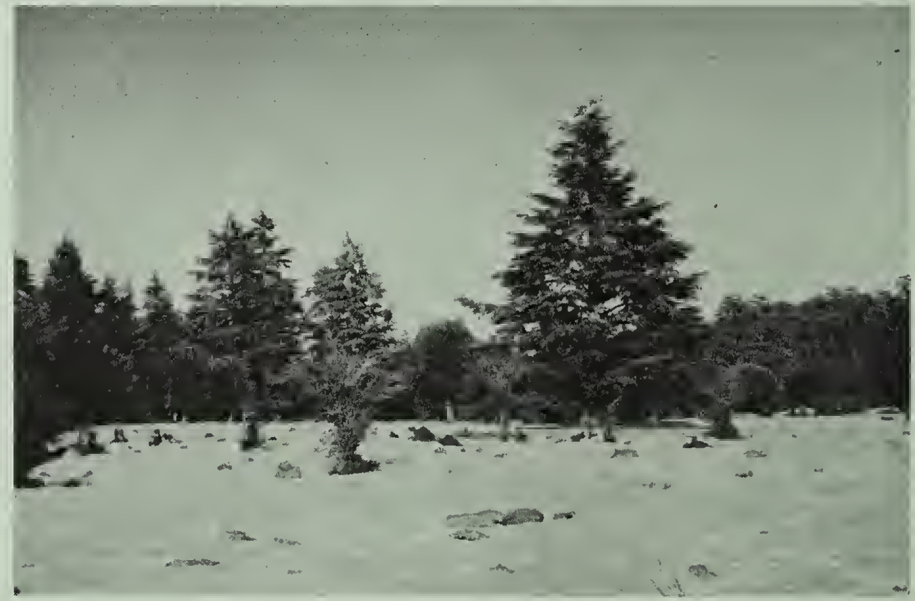

Fig. 11. *Cedrus atlantica* at Azrou

We were closer to the mountains now than we had been on the train and were favored by tantalizing glimpses of their snow-covered summits in sharp contrast to the red shales of the hillsides all around us. About the only plants here were cork oak and juniper.

The valley itself is a cool, pleasant sylvan retreat and we had an excellent meal at a small hotel perched far above the Ourika River.

The following day we left at dawn for the 120 mile drive southward over the High Atlas Mountains to Ouarzazarte on the northern fringe of the Sahara Desert. As on our trip of the previous day, we first crossed the plains and then climbed into the mountains. The soil here was chocolate brown and small mountain villages, nestling in the valleys, were of the same color.

At Taddert, which is approximately 5000 feet above sea level we stopped for coffee and I walked ahead along the road for a hasty inspection of the vegetation. Cork oak and juniper were still abundant, but here was our old friend *Cistus monspeliensis,* which we had seen all

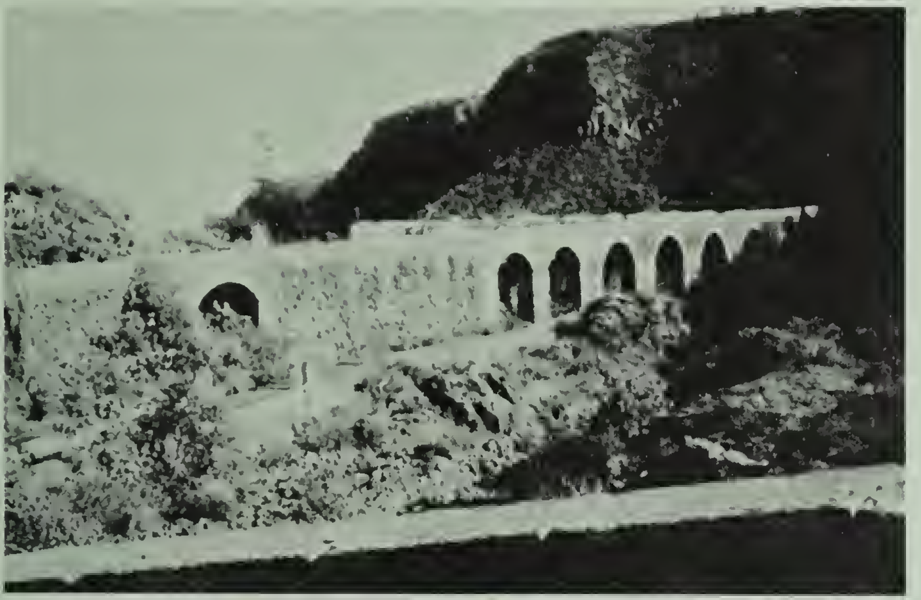

Fig. 12. Jardín El Canario

over Sardinia and Corsica in May. Here also was *Adenocarpus anagyrifolius,* a yellow flowered legume. A leafless, rush-like plant which I thought to be an *Ephedra* was later identified by Dr. Mathez as a *Retama.*

The pass over the Mountains on this road is at Tichka (2260 metres or about 7500 feet). (Fig. 4). Here we were well above tree-line and the only plants were tufts of grass and lichens. Towering snow-clad ridges were all around us; it was very cold and we were grateful for having started out that morning in warm clothing. We were actually standing in the High Atlas Mountains of Morocco! (Fig. 5).

After leaving the pass we descended abruptly into the plains. This is Berber country and there were picturesque villages on all sides. In places the dark brown soil gave way to garish red shales and occasionally to pure white limestone.

Just before getting into Ouarzazarte we turned off the road to see the Kzar of Tiffoultoute. Kzar means stronghold and this fine old structure is well worth a visit. Many of the rooms are beautifully furnished and we climbed to the roof for a view of the surrounding country and a close look at a nesting stork.

Once in the city, which is the administrative capital of the region, we visited the casbah of the Glaoui. Following lunch we made the return trip to Marrakech. The sun was now behind us and the lighting effects which it produced on the mountains were indescribable.

Fig. 13. Balconies at Teror

The following day we took the train for Rabat, passing through Casablanca en route, and arriving at the capital in late afternoon.

Our morning sightseeing in Rabat included a look at the ornate gates of yet another of the King's Palaces and the necropolis of Chellah. Kininmonth refers to the latter place as "a walled enclave of perfect serenity, sun-baked yet green and watered, shaded in places by great trees." Once through the gates, one descends steeply to the area of the tombs and a picturesque minaret crowned by a stork's nest. Two exotic plants here in full bloom were *Datura arborea* and *Tecomaria capensis.* Beyond lie the remains of a Roman forum which are being excavated.

We went next to feast our eyes on the Hassan Tower (Tour Hassan) and mosque. The twelfth century tower, a thing of great nobility, stands among the ruins of the mosque of which the only remains are 312 marble columns and over a hundred pillars. Nearby is the ornate tomb of Mohammed V who died in 1961.

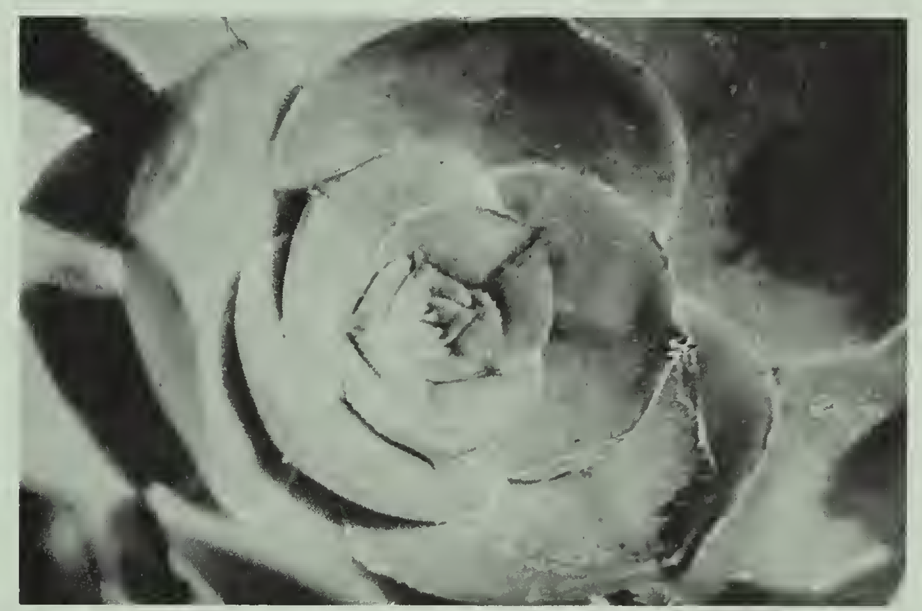

Fig. 14. *Aeonium Manriqueorum*

Our final visits of the morning were to the casbah, with its colorful garden and the medina or old city. Unfortunately, the Museum of Moroccan Art was closed on that particular day.

That afternoon we visited the Botanical Garden of the Mohammed V University where we were cordially received by Dr. J. Mathez, the director. After checking my identifications of the plants I had collected several days earlier in the High Atlas, Dr. Mathez took us around his small but very interesting garden which is devoted largely to Moroccan plants.

Here were three species of rock rose, *Cistus albidus,* (which we had collected in the maquis north of Grasse) and *C. salviaefolius* and *C. monspeliensis* (which we had seen everywhere on our Mediterranean Tour in the spring of 1972). We were intrigued by a luxuriant specimen of *Ephedra altissima,* a native of North Africa. Of spurges, there were *Euphorbia Tirucalli* and *E. regis-jubae,* the latter a small tree-like species coming from the Canary

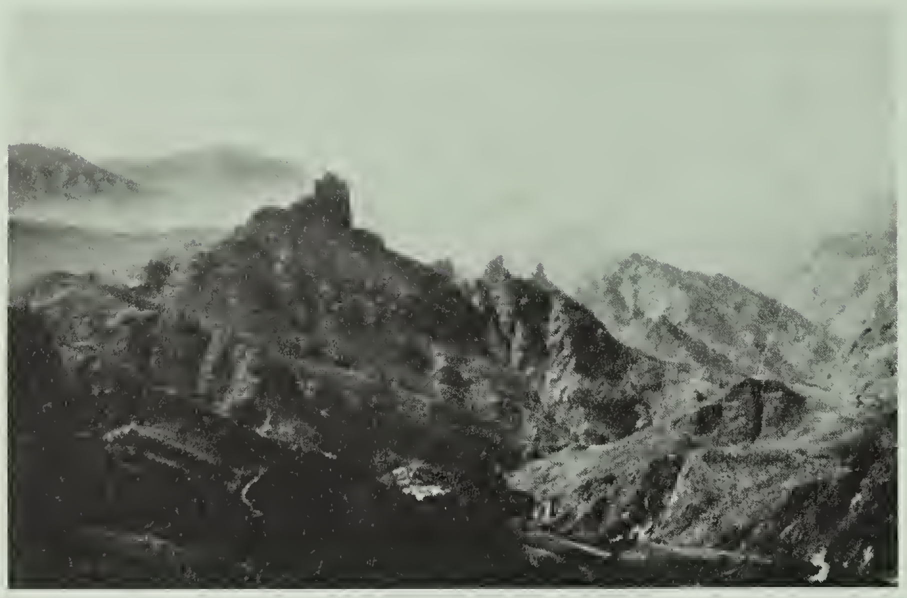

Fig. 15. Cruz de Tejada

Islands. There was a handsome plant in full flower of *Aeonium arboreum,* which is native to Morocco, but is also distributed rather widely throughout the Mediterranean. A fuller discussion of this succulent genus occurs later in this account. The Phoenician juniper *(J. phoenicia),* indigenous to the Mediterranean region, was represented by a mature specimen just coming into "fruit." (Fig. 6).

I told Dr. Mathez of our disappointment in not having seen the Atlas cedar, *Cedrus atlantica,* on our traverse of the High Atlas Mountains and he explained that it is absent there, but occurs on the Middle Atlas range, a series of parallel ridges lying well to the north. Since we told him we were going to Fes, he urged us to make the trip up to Azrou if we wished to see this species in its native haunts.

Later that day we drove over to Salé, across the river from Rabat, and wandered for some time around its narrow streets. This is a very old city, one which has to a large extent defied the advance of modern civilization.

The following day we drove from Rabat to Fes by way of Meknes. Our road led for many miles through forests of cork oak. Our driver told us, somewhat to our surprise, that the bark is removed here every three years; we had thought the interval to be closer to eight or ten.

We stopped to collect a handsome yellow-flowered "broom", which proved to be *Genista hirsuta,* but were unable to identify a small pink-flowered crucifer which was forming a dense ground cover as far as one could see. Another roadside plant was a robust white-flowered asphodel, which we took to be *Asphodelus albus.*

Certainly one of Australia's greatest gifts to the rest of the world is the eucalyptus, here cultivated in plantations covering many square miles. The species, as far as we could determine, is *E. globulus.* Another impressive sight, as we drove on, were vast fields of mint, probably *Mentha sativa.* (Fig. 7) Mint-tea is a very popular drink in Morocco and we saw enough mint in this one area to support, as it seemed to us, the entire population. Among other cultivated crops on this leg of our journey were grapes, figs, almonds and olives.

Shortly before noon we arrived at Meknes, an eleventh century city with a population of 200,000. We stopped to visit a beautiful mosque (one of the few which may be entered by the non-Moslem) and the stables of Moulay Ismail which accommodated 12,000 horses.

We happened to be in Morocco just before "Sheep Day". This in a sense corresponds to our Thanksgiving, except that instead of a turkey each family kills and devours a sheep. At Meknes, and later at Fes and Azrou, herds of sheep were being driven to market. (Fig. 8). Some were carried in wheelbarrows, some on trucks or over mens' shoulders. We thought we had seen every mode of transportation when a train of donkeys appeared, each bearing two sheep in his saddle bags and another flung across his neck.

A few miles from Meknes is Moulay Idriss, a picturesque village perched atop a rugged spur of hills. Since we were eager to push on to Volubilis, our pause here was but a brief one; long enough to suggest that this town would be well worth a respectable visit. A short distance farther on stands Volubilis, one of the most important examples of Roman occupation in North Africa. (Fig. 9).

Founded in the earliest years of the Christian era, or as some believe even earlier, Volubilis must be an archeologist's paradise. Abandoned for centuries, ravaged by earthquakes, it still stands as a paragon of Roman engineering and architecture. Miles of streets, scores of houses, the remains of a basilica and an aqueduct, bits of elegant sculpture, superb and colorful mosaics (which reminded us strongly of the ones we had seen at Piazza Armerina in Sicily) all combined to render this experience worthy of far more than the hour and a half we were able to devote to it. Late that afternoon we checked into our hotel, the Palais Jamai, in the ancient city of Fes. (Fig. 10).

The following morning (January 11) was occupied by walking, with an excellent guide, through the bewildering maze of narrow streets and countless shops which constitute the souks. Since practically everything in Morocco is made by hand it was fascinating to witness here, as well as elsewhere, the manufacture of furniture, the fash-

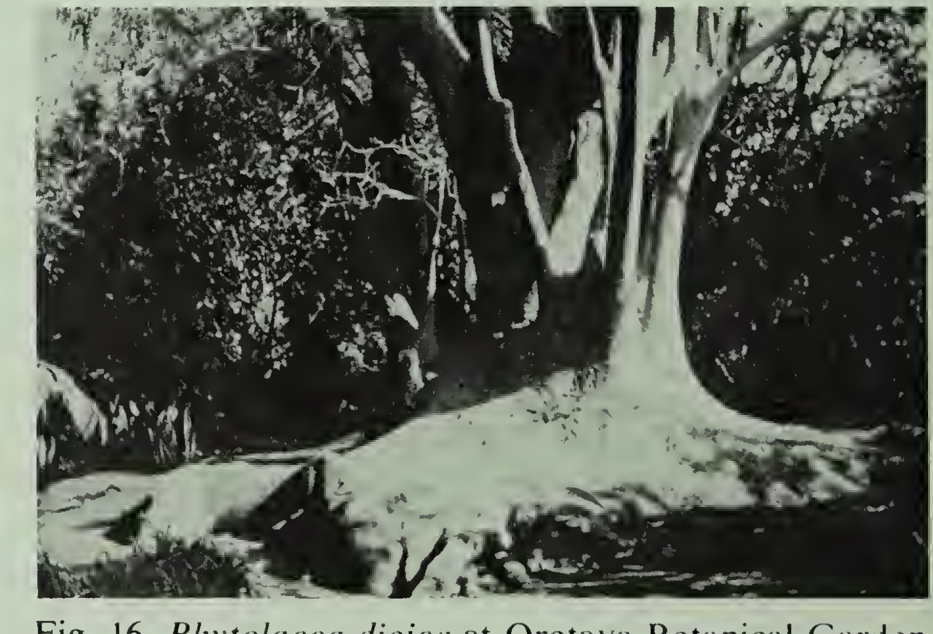

Fig. 16. *Phytolacca dioica* at Orotava Botanical Garden

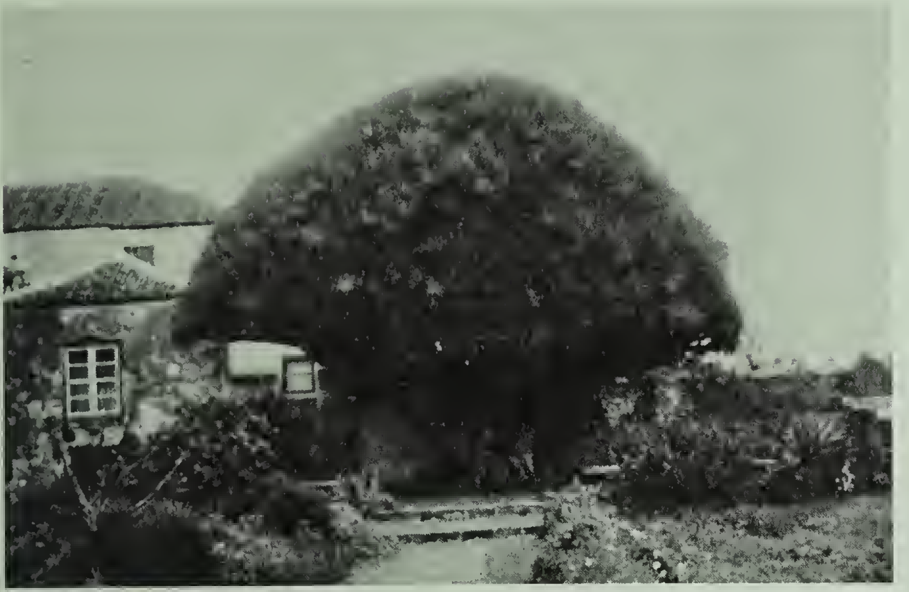

Fig. 17. *Dracaena Draco* at La Laguna

ioning of brass, copper and leather objects and the weaving of rugs and textiles.

That afternoon we drove some forty miles southward to Azrou which is situated high up among the snows of the Middle Atlas Mountains. This was the place where Dr. Mathez had said we would find the Atlas cedar growing wild and as we drove for mile after mile through solid stands of cork oak we began to despair of ever seeing this handsome conifer. However, a few miles east of Azrou we saw the first scattered specimens and finally we emerged on a snow-covered plateau around the edges of which were dense stands of the cedar. Having long been familiar with this species in cultivation, it was truly exciting to find ourselves in a native forest of these majestic trees (Fig. 11).

The full measure of our good fortune was not made known to us until later when we learned that on the day after our visit there had been such a heavy fall of snow that all access roads to Azrou had been closed.

The following morning we drove for some time around the ramparts of Fes, which afford impressive views of the city in its bowl-like setting. We also visited the Dar Batha Museum of Moroccan Arts. The building was at one time a palace and adjoining it is a garden which contains some of the tallest cypresses we had ever seen. Following lunch we drove back to Rabat.

On the morning of January 13 we paid a visit to the Jardin Exotique, a privately owned garden a few miles outside the city. This was the only rainy day of our entire stay in Morocco and as a consequence we saw this collection under rather adverse conditions. It occupies a long narrow strip of land and is divided into several sections, each of which has its own numbered trail. The character of the planting was distinctly sub-tropical, with such genera as *Datura, Monstera, Gunnera* and *Erythrina.*

After lunch our very efficient and likeable guide and chauffeur drove us to the airport in Casablanca where we took the plane for Las Palmas, the capital of Gran Canaria, arriving there after dark.

The archipelago known as the Canary Islands consists of seven large islands and several smaller ones. Together they form a kind of semicircle, the eastern tip of which is about 60 miles west of the coast of Africa. They are volcanic in origin and represent the summits of very high peaks which have their bases deep in the waters of the Atlantic Ocean.

The Canaries have played an important role in the annals of navigation and exploration. As early as the twelfth century they were visited by Arab sailors and during the fourteenth and fifteenth centuries French and Spanish navigators landed there. In August, 1492, Columbus put in at Las Palmas, where he stayed some days while the rudder of the ''Pinta'' was being repaired. Many later expeditions stopped there before crossing the Atlantic.

Due in part to their geographic position these islands possess a large number of endemic plants, i.e. species which occur nowhere else. Indeed the degree of endemism has been placed as high as 30% by some atuhors.

On the morning following our arrival we set out to explore the richly planted grounds of our hotel, the Santa Catalina. First, though, it was our great good fortune to purchase in the lobby a copy of ''Plants of the Canary Islands,'' by Hans-Helmut Schaeffer. This little volume with 123 illustrations (28 in color) and the text in German and English, was to be our constant and indispensable companion during our ten days in the Canaries.

Directly in front of the hotel were two fine specimens of the dragon tree *(Dracaena Draco)*. This is one of the most famous trees on the islands and later we were to see the second oldest in existence.

Our attention was next attracted by *Euphorbia canariensis,* a handsome candelabra spurge which is endemic to the islands. It frequently forms solid stands on the dry slopes of lava.

This seems as good a place as any to point out that the specific name *canariensis,* does not invariably denote a true endemic. Some species with this epithet also occur in Madeira, or even on the mainland. And in one case, at least, the name is a complete misnomer: *Quercus canariensis* is a native of Spain and Portugal.

The endemic date palm of the Canaries is *Phoenix canariensis,* which differs from the classical *P. dactylifera* in its more slender habit and more numerous leaves.

We were greatly intrigued by a succulent plant with jointed, swollen stems looking like strings of sausages.

Fig. 18. El Pico de Teide

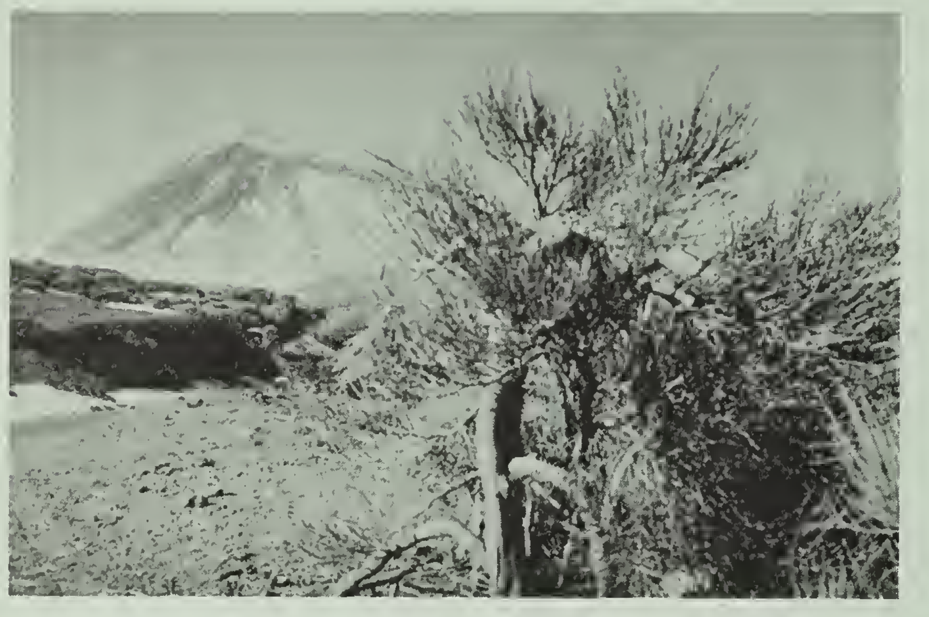

Fig. 19. Retama blanca on slopes of El Pico.

The fluffy remnants of its fruits proclaimed it a composite and with the aid of our newly acquired handbook we quickly identified it as *Kleinia (Senecio) nereifolia*, another Canary endemic. Still another (also a composite) was a low growing shrub with soft silken foliage and bright yellow flowers; this proved to be *Odontospermum sericeum*.

In addition to these island specialties, there were scores of interesting plants from other parts of the world. Just a few of these may be selected for mention. Of Ficus there were three species: *elastica*, *lyrata* and *nitida*. From Madagascar came *Dombeya Wallichii*, with hanging clusters of luscious pink flowers. From South Africa we had *Carissa spectabilis*, looking in fruit for all the world like an olive, and *Cassia didymobotrya* with upright racemes of bright yellow flowers. We had seen the latter species at Stellenbosch on our African Tour and at that time had remarked on its close resemblance to the Mexican *C. alata*. Another old friend from South Africa was *Portulacaria afra*, said to be a favorite food of elephants; here it was treated as a hedge. South America had contributed the jacaranda (not yet in flower) and from Japan had come *Oplopanax japonicus*, a tree with large peltate leaves on elongated petioles.

That afternoon we paid the first of three visits to Jardín El Canario, a fascinating garden situated on opposite sides of a ravine or barranco which is spanned by a stone bridge (Fig. 12).

On the way to the garden we passed through mile after mile of plantations of bananas, one of the chief crops of the Canaries. We had seen bananas growing in Central America when the "Banana Republics" produced most of the world's supply. There, however, the plantations were on flat land and one could seldom appreciate their magnitude. Here, in one shallow valley after another, there was almost nothing but bananas as far as the eye could see. And where there were no bananas there were vast greenhouses for the cultivation of carnations and cucumbers.

Since El Canario is dedicated to growing only plants indigenous to the islands, we saw here again some of the species which we had noted earlier in the day on the hotel grounds. There were hundreds more, of course, and many of them bore the specific name *canariensis*, e.g. *Laurus* and *Apollonias* (Lauraceae), *Helianthemum* (Cistaceae), *Ilex* (Aquifoliaceae), *Canarina* (Companulaceae) and *Arbutus* (Ericaceae). These were but a few. Of numerous other endemics the following few have been selected for special mention:

Echium Decaisnei and *E. fastuosum;* handsome shrubs of the Boraginaceae with upright panicles of white flowers.

Myrica Faya; an evergreen relative of our bayberry. We saw it later on Tenerife.

Convolvulus floridus; an upright shrub with narrow leaves and white flowers.

Sonchus leptocephalus; unlike the more familiar herbaceous members of the genus, this is an erect shrub with thread-like pinnate leaves and long-stalked yellow flowers. The related *S. congestus* is an endemic rock plant with bluish green rosette leaves. We saw it everywhere in the islands.

Rumex lunaria; this is another genus which is known to us mainly through its herbaceous members, but which here is a robust shrub with bright green cordate leaves and loose upright panicles of brownish-green flowers.

Lavandula abrotanoides (multifida); unlike most lavenders, this species has doubly pinnate leaves. Its spikes of blue-violet flowers were fully out at the time of our visit.

Dendripoterium Mendenezii and its variety *virescens*. This genus, which belongs to the Rosaceae, derives its name from the resemblance of its pinnately compound leaves to those of the herbaceous *Poterium* (also known as *Sanguisorba*). It is a monotypic genus and is found only in the Canary Islands. The variety differs in having somewhat larger leaflets.

One of the most interesting of all groups of plants found in the Canary Islands is the genus *Aeonium*, a member of the Crassulaceae or stone-crop family. Of the forty species belonging to this genus the great majority are found only in these islands; the few others are scattered in such countries as Abyssinia, Arabia and Morocco (we have already mentioned seeing *A. arboreum* in Rabat).

The fleshy obovate or spatulate leaves of these plants are spirally arranged in rosettes which may be as much as a foot or more in diameter. When young these rosettes are often flat against the rock-faces, but in some species older plants may develop a stem which attains a height of three or four feet. The term "pinwheel plant", occasionally applied to them, is well deserved. The flowers which are usually yellow, but may be white or pinkish, are borne in upright panicles. The related genera, *Greenovia* and *Aichryson*, are also represented in the Canaries.

These succulents have become very popular as house plants and my wife has several of them in her collection and was desirous of obtaining additional species. When Señor Socorro, the superintendent, learned of her interest he took us into that portion of the nursery where there were hundreds of plants of *Aeonium* and the related genera, representing all of the species known to occur in the Canary Islands. He generously gave us propagating material of half a dozen species including *Ae. tabuliforme, nobile* and *percarneum.*

Later on that first afternoon we drove across the island to Arucas to see a garden which had been recommended to us. This is really more of a public park than a botanical garden, but it contains such interesting mature trees as *Araucaria Bidwillii* and *Cunninghamii* from Australia; *Annona Cherimola,* the cherimoya from South America; *Cinnamonum Camphora,* the camphor tree, from eastern Asia; and our own *Magnolia grandiflora.* A conspicuous feature of some of the beds was the New Zealand flax, *Phormium tenax,* just coming into flower.

On Tuesday, January 16, we set out for Cruz de Tejada, a mountainous area near the center of the island. Our first stop was at Teror, a village celebrated for the balconies which adorn almost every house (Fig. 13).

From Teror the road ascends steeply to Valleseco and thence follows a ridge along which are numerous miradors that afford gorgeous views of the surrounding country. It was along this road that we first saw *Aeonium* growing wild in quantity. On the rocky faces of almost every road-cut, especially those facing the north, these plants were massed so densely as to form almost a solid ground-cover. Within a space of a few miles near Lanzarote we saw three species: *canariense, percarneum* and *Manriqueorum.* (Fig. 14)

As we approached Cruz de Tejeda our attention was attracted by an evergreen shrub with stiff, needle-like leaves. We thought at first that it was one of those scandent species of *Asparagus* common to this part of the world. Farther on, however, a few plants with bright yellow flowers came into view and we stopped for specimens and photographs. Our ''asparagus'' turned out to be *Adenocarpus foliolosus,* an endemic Canarian legume, one which occurs only in this rather limited area. Our book told us that it flowers from March to April, so we were fortunate in catching a few precocious blooms in mid-January.

Another leguminous shrub or small tree, with a simularly restricted range, was *Cytisus proliferus,* here in full flower with white butterfly-wing corollas closely besetting the upright branchlets.

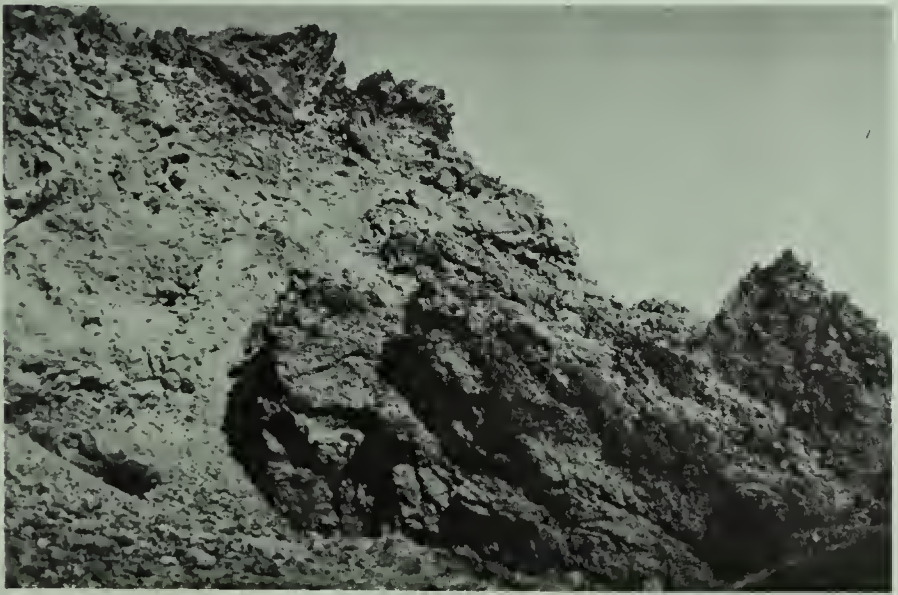

Fig. 20. Lavas on El Pico

The comfortable parador at Cruz de Tejada, where we stopped for lunch, affords a superb panorama of the interior of an ancient crater in which the lava has been eroded to produce a weird landscape of crags and pinnacles. (Fig. 15).

Around noon on the following day we flew from Las Palmas to Santa Cruz de Tenerife, the capital of Tenerife, the largest island of the archipelago.

We were delighted to discover that almost directly in front of our hotel was a spacious public park, El Parque Municipal García Sanabria, which was beautifully planted with a wealth of interesting material. Here were some of the finest African tulip trees *(Spathodea campanulata)* we had ever seen. There were three tall plants in full fruit of the fish-tail palm *(Caryota urens).* The genus *Ligularia,* a yellow-flowered relative of *Senecio,* was in full bloom and another attractive composite—this one from tropical America—was *Montanoa bipinnatifida.*

Probably the most famous feature of Tenerife over the centuries has been its lofty volcanic peak, known locally as El Pico de Teide, its 12,250 feet summit having served as a landmark for the navigators of many nations. Before paying homage to it, however, we went on January 18 to visit the botanical gardens of Orotava. These gardens, which occupy an area of about five acres were founded in 1788. The attractive illustrated guide, which we obtained at the entrance, lists over 220 species in cultivation, but this is by no means complete. From such a rich variety it is difficult to single out individual examples. There is a distinguished collection of palms, one of the most unusual of which was *Jubaea spectabilis,* the wine palm of Chile. Ferns were represented by a wide diversity of genera and species and there were sections devoted to cacti and succulents as well as to aquatic plants. One specimen which requires special mention was the ombu tree, *Phytolacca dioica,* which is notable for its enormous girth at the base of the trunk (Fig. 16) We had seen this tree first in Madeira some years ago and again last May in Corsica. A native of Argentina, it seems indeed a strange congener of our pokeweed. Another species not too often seen in Old World gardens was *Haematoxylon campechiana,* the dyewood from tropical America. The presence of such genera as *Dillenia, Lucuma, Bixa, Psidium* and *Andansonia* bore eloquent testimony to the mildness of the climate. In addition to the outdoor collection there is a greenhouse containing orchids, bromeliads and ferns. This is indeed a garden in which any community may take great pride.

On our way back to Santa Cruz we stopped off at the seminary in La Laguna to see a gigantic dragon tree, said to be the second largest in the islands (Fig. 17). Although the age of these patriarchs is often given as two or three thousand years, this is largely a matter of conjecture.

On January 19 we made the lengthy all-day trip to El Pico and back around the south shore of the island. For many miles we drove through the Bosque de la Esperanza, a forest where the dominant tree was the beautiful Canary pine, *Pinus canariensis.* The road then emerged to follow a hogback which was punctuated with many miradors or look-outs. From one of these, the Mirador Ortuño, we caught our first real glimpse of El Pico (Fig. 18). As the road continued westward we were treated to view after view of this majestic, snow-tipped peak ahead of us and to seemingly endless forest plantings of the Canary pine on both sides.

At the level of 6500 feet most of the trees had disappeared and almost the only plant to be seen was the well-known "Retama del Pico", or "Retama blanca". This thick-stemmed, nearly leafless shrub is botanically known as *Cytisus (Spartocytisus) nubigenus* and is found only here in Tenerife and in the island of La Palma at altitudes exceeding 5000 feet. Its whitish, strongly aromatic flowers do not appear until April, so we were too early to enjoy them, but we were genuinely impressed by its complete domination of the lower slopes of El Pico. (Fig. 19).

Soon we emerged into a region of contorted and multi-colored lava flows where visible plant life was entirely lacking. High winds that day prevented us from taking the cable car to the summit, so we had to be content with driving through the lava fields and the caldera at its base. This, in itself, was thoroughly satisfying for the lavas were of a great variety of colors (red, brown, gray, black, yellow, green and whitish) and the contorted formations into which they had been fashioned were like something out of a nightmare (Fig. 20).

On the grounds of a parador, where we retreated for refreshments, were the huge basal rosettes of a plant known as, "The Pride of Tenerife." This is *Echium Bourgaeanum,* which in May and June produces racemes five or six feet tall of bright red flowers. In a close relative, *E. simplex,* the flowers are white; both are Canarian endemics.

Our drive around the western slopes of El Pico took us through a far-reaching crater on our left with glimpses of smaller craters and cinder cones on the more recently active slopes. The latest eruption of El Pico was something over a century ago.

The descent took us down to the coast and back along the new "super-highway" through agricultural country where bananas and papayas were the chief crops. Closer to Santa Cruz we traversed a considerable area of dry lava hillslope where *Euphorbia canariensis* and *E. regis-jubae* (here known as tabaiba) seemed to vie with each other as conspicuous components of the vegetation.

On the afternoon of Sunday, January 20, we drove up to the Monte de las Mercedes, near the eastern end of the island. This is a region of misty headland lying between two and three thousand feet above sea level. It is dominated largely by dense stands of *Erica arborea* with the smaller *E. scoparia* as a constant companion. Two other conspicuous evergreen shrubs, both endemic, were *Laurus canariensis* (here in full fruit) and *Myrica Faya.* But the great excitement of this trip derived from the presence of the genus *Aeonium* and its relatives.

For much of its extent the winding road had been cut through thick layers of lava and the bare rock faces on both sides of these narrow defiles were frequently festooned with dense stands of these fascinating succulents, in many cases tantalizingly out of reach! It was here that we saw *Ae. caespitosum, decorum, Goochiae* and *Haworthii,* as well as the related *Aichryson dichotomum, Greenovia aurea* and a delicate small-leaved *Monanthes* of an unknown species. Of all our botanical experiences in the Canaries this had to be the most memorable.

The return trip took us down through agricultural land where a conspicuous plant of roadsides and fallow fields was *Oxalis pes-caprae,* a sorrel with bright yellow flowers standing well up above the trifoliate leaves on naked scapes.

The next day, January 21, we flew back to Las Palmas and the following morning paid a final visit to Jardín El Canario for the purpose of having Señor Socorro check the identifications of several of the plants we had collected.

On January 23 we departed for home, traveling by way of Madrid. The Sierra Guadarrama north of the airport in Madrid were deeply covered with snow and we began mentally to prepare ourselves for a white ground-cover at home. It was therefore with mixed emotions that we learned that there had been no measurable fall of snow during the four weeks that we had been away.

In retrospect it would seem that a very interesting and enjoyable Barnes Tour to this part of the world could be arranged, starting perhaps in Lisbon, spending two weeks in Morocco and one week in the Canary Islands, with a stop-off in Madeira on the way home.

A HOLLY CHECKLIST

Contribution Number 3 from the United States National Arboretum, which has recently been received, is entitled "International Checklist of Cultivated Ilex, Part I, Ilex opaca."

This is obviously the first of several publications which, when completed, will include the names of all known cultivar names in this genus of popular evergreen trees and shrubs.

The Introduction emphasizes that this Checklist is international in character and states that much pertinent foreign literature has been reviewed, a fact which will be particularly apparent in subsequent parts, currently being prepared, in which some descriptions will be given for the first time in English.

The present section contains the names of more than 1000 cultivars of *Ilex opaca* with information concerning the source or place of origin, discoverer or selector, namer, introducer, registration and patents. It will prove an indispensable guide for all who are interested in our familiar American holly. It may be obtained without cost by writing to the International Checklist Committee for Cultivated Ilex at the U. S. National Arboretum, Washington, D.C 20002.

NOTES FROM THE ARBORETUM

THE STAFF

As outdoor consultant at the Schuylkill Valley Nature Center, Dr. Gordon approved plans for extending the Edgar T. Wherry Fern Trail and also conferred on the proposed Nature Trail for the Handicapped. In January, 1973, he submitted a report entitled "Environmental Diversity at the Tyler Arboretum" to the trustees of that organization. Also in a consulting capacity, Dr. Gordon is assisting the Smithsonian Institution in defining certain areas on the Coastal Plain suitable for designation as National Landmarks. A revised edition of his publication on "The Natural Vegetation of Ohio in Pioneer Days" is in preparation by the Ohio Biological Survey at Columbus. A limited number of his maps of the "Original Vegetation of Ohio" are available from him upon receipt of a self-addressed, stamped envelope of legal size.

Mr. Heeps has recently accepted the important responsibility of serving as editor of the Bulletin of the American Association of Botanical Gardens and Arboreta. He will represent the Arboretum, as well as the Henry Foundation, of which he is Assistant Director, at the forthcoming meetings of the A.A.B.G.A. in Arcadia, California.

Mrs. Hopkins is the author of an article entitled "Unusual Small Trees" which appeared in The Green Scene for January-February, 1973.

In December, Dr. Louis S. Marks attended the Washington meeting of the American Association for the Advancement of Science. More recently, he was on a Middle States Evaluation Team in New York City. He will spend the summer in England and on the Continent where he will continue his researches in evolutionary biology. To assist him in his endeavors, Saint Joseph's College has awarded him a Faculty Research Grant. His most recent publication in this area appeared in the November 1972 issue of the Annals of the Entomological Society of America.

Dr. John Penny and Dr. Norbert Belzer of the La Salle College Biology Department have concluded a three-year floristic study of the Penllyn Natural Area in Montgomery County with the printing of an annotated checklist containing over 500 taxa. Dr. Edgar T. Wherry gave invaluable assistance in this study. Botanical studies will be continued in the Penllyn area in an effort to compile checklists of the Algal, Fungal, and Bryophyte floras. Copies of the Vascular Plants Checklist for the Penllyn Area are available from Mrs. Wheeler at the Barnes Arboretum office.

At the annual banquet of the Men's Garden Club of Delaware Valley on October 25, Dr. Fogg presented an illustrated lecture entitled "Anzac Adventure - a Botanist in New Zealand and Australia". On November 9 he spoke to the Philadelphia Chapter of the American Rhododendron Society on "The Heath Family at the Barnes Arboretum" and on December 16 he gave a talk "On Mediterranean Shores" to the Philadelphia Botanical Club.

A MAGNIFICENT GIFT

Mr. and Mrs. Walter P. Quintin, of Thornton, Pa., have long been loyal friends of the arboretum and several of us have greatly enjoyed visiting their spacious grounds with its rich collection of unusual trees and shrubs.

Recently the Quintins decided to move, but before putting their property on the market they generously offered us the opportunity of removing any plants that we wanted for the arboretum.

During late summer and fall of 1972 we made three trips to their place and brought back over sixty rare and interesting specimens to enrich our own collections.

Lack of space prevents giving the list in full but the character of the collection may be gathered from the fact that the majority of the specimens fall into the category of dwarf or slow-growing conifers—a group of plants which is enjoying well deserved popularity today.

The collection includes interesting forms of *Abies, Cedrus, Chamaecyparis, Juniperus, Picea, Pinus, Thuja* and *Tsuga*. One of the most unusual is a beautiful specimen of *Sequoia sempervirens* "Pendula Aurea'. We were delighted, also, to receive young plants of *Pinus parviflora, P. aristata* and *Thuja plicata*.

Among the broad-leaved evergreens were two fine specimens of *Ilex ciliospinosa,* which we placed in front of the gallery, and a very handsome *I. crenata* 'Nummularia'. There were five species of *Rhododendron,* including the rare *R. yakusimiana*. We were also very pleased to have *Pieris phillyreaefolia* for our Heath Garden. Noteworthy among the deciduous material were *Disanthus cercidifolius, Stewartia monadelpha* and *Syringa pinnatifolia*.

We are deeply grateful to the Quintins for this splendid donation to the arboretum.

A SECOND HEATH GARDEN

In Issue Number 7 of this Newsletter, dated September 1971, there appeared an account of our attempts to establish a small garden devoted primarily to growing heath and heathers and other members of the Ericaceae or heath family.

Most of the plants which had been placed in this garden during the autumn of 1971 came through the following winter in excellent condition and made very satisfactory growth during the summer of 1972.

As word of what we were doing got around we were very pleasantly embarrassed by the donation of living plants to augment our growing collection. The Don Smiths of Watnong Nursery made substantial contributions and our most important benefactor was Mr. James Cross of Cutchogue, Long Island, who gave us more than forty cultivars of *Erica* and *Calluna*.

It soon became apparent that we could not accommodate this greatly increased number of plants in the original bed, so we set about preparing another and larger area immediately adjoining it. As in the case of the earlier bed we went down nearly two feet, removing the top soil and adding leaf-mold, peat and sand to create an acid medium. Our good friend, Mr. John Kistler, then obtained some large quartzite boulders from a quarry in Chester County and superintended their placement in the new garden. At the same time he vastly improved the appearance of the original bed by skilfully placing therein some of the larger stones to carry out the appearance of natural rock ledges. Today it bears no resemblance whatever (except in general outline) to the photo of it which was reproduced in our Number 7 issue.

In the late summer of 1972, after the soil had had a chance to settle, we began planting the new heath garden. Desirous of achieving somewhat more accent than would be possible with a solid carpet of heaths and heathers, and also of providing a modicum of shade for such species as require it, we first put in place a few Ericaceous shrubs, such as *Chamaedaphne calyculata, Leucothoe recurva, L. Keiskii, Elliottia racemosa, Lyonia mariana, L. lucida (nitida), Pieris floribunda, P. phillyreaefolia, Vaccinum stamineum* and *V. vacillans.*

Then came the pleasant task of setting out our new heaths and heathers, and such related plants as box huckleberry *(Gaylussacia brachycera)* and mountain-cranberry *(Vaccinium Vitis-Idaea).*

As these plants were ''bedded-in'', by the end of October, 1972, we decided that they should be given a light cover of conifer boughs for the oncoming winter. As this number goes to press the ground has not only been without snow-cover (an unprecedented record) but is still unfrozen!

It will be interesting to observe what the effect of all this will be upon a group of plants with rather specialized growth requirements.

THE HARVEST SHOW

For the 1972 Harvest Show, sponsored by the Pennsylvania Horticultural Society, the Arboretum staged an exhibit of Broad-leaved Evergreens. Two of our third-year students Mrs. Philip Bagley and Mrs. Belmont Farley kindly agreed to serve as co-chairman for this project and spent many hours collecting, labeling and mounting the material.

The collection included 104 specimens representing 38 genera and 18 families. A key to the display listed the families and showed a circle of a given color for each one. This color was repeated in the descriptions of the individual families and for every species which belonged to them.

For each species there was a label containing the botanical name, the common name and a brief description of the habit of the plant, its horticultural attributes, its native country and the year of its introduction into cultivation.

It is gratifying to report that this display was awarded the silver bowl of the Pennsylvania Horticultural Society for an ''Exhibit of Extraordinary Merit''.

A SALICETUM

Just as a Quercetum is an assemblage of oaks (*Quercus*), so a collection of willows (*Salix*) may appropriately be termed a Salicetum.

Until very recently the arboretum's representation of the genus *Salix* has been a very modest one and has not included a single species native to North America.

Since we were keenly desirous of incorporating some native species into our collection and because we had heard that there was fine series of native willows at Michigan State University, we wrote to Professor Milton Baron who is Director of the Division of Campus Park and Planning of that institution. Professor Baron turned our request over to Dr. George Parmelee, Curator of the University's Woody Collections.

As a result of this correspondence there arrived here on December 6, 1971, a box containing vigorous rooted cuttings of thirteen species of native American willows. The following were represented:

S. amygdaloides
S. Bebbiana
S. candida
S. cordata
S. discolor
S. humilis
S. interior
S. lucida
S. nigra
S. pedicellaris
S. petiolaris
S. rigida
S. sericea

After spending the winter in a cold frame these specimens were planted out in the spring of 1972. Instead of adding them to the few exotic species noted above (which occupy a very crowded area) they were given a place in an open site just south of the school on Lapsley Road, where there is room for additional plants as they are obtained.

We are extremely grateful to Professor Baron and Dr. Parmelee for enabling us to initiate a Salicetum of native species.